

## **SESSION 12 – NAVIGATION AND INFORMATION SYSTEMS II**

### **CHAIR**

Andrew Silver, Naval Surface Warfare Center, Carderock Division, United States Navy

### **COORDINATOR**

Siraj Khan, U.S. Customs Service, Department of Treasury

### **TITLE OF PRESENTATIONS AND SPEAKERS**

“Ship Performance Measurements—Houston Ship Channel, Galveston Bay, Texas” by Larry L. Daggett, Waterway Simulation Technology, Inc.

“Entrance Channel Design Tool” by Andrew Silver, U.S. Navy and Zeki Demirbilek, U.S. Army Corps of Engineers

“Next Generation of Navigation Aids Research (NGEN NAV)” by Walter Heerlein, Rich Hansen, and Ric Walker; U.S. Coast Guard Research and Development Center

“Integrated Marine Communications – A Tool to Improve Vessel Management” by James Tindall, MariTEL and Ronald Gaynor, Harris Corporation

“Automated Commercial Environment (ACE): Business and Technology Benefits” by Charles Armstrong, U.S. Customs Service

### **SUMMARY**

This was the second of two technical sessions dedicated to Maritime Navigation and Information Systems. The five papers presented at this technical session focused on the

dynamics of deep draft ships in shallow and narrow entrance channels, improvements to the Coast Guard’s navigation aids, ship to shore communications, and new devices and procedures to aid the Customs service track cargo.

### Ship Performance Measurements—Houston Ship Channel, Galveston Bay Texas

There were two papers that investigated the motions of ships in narrow and shallow channels. The first paper by Waterway Simulation Technology Inc. looked at vertical and horizontal ship motions in the Houston Ship Channel, and documented the relevant environmental and ship control factors that influence the ship motions. The ships chosen for this study were tankers, container ships. Ship position and motion measurements were obtained by Differential Global Positioning Satellite (DGPS) receivers. The ships were instrumented with potentiometers and cameras to record the engine RPM and rudder position to collect data on maneuvering and controllability. Water level data were obtained from NOAA’s PORTS system and the water current data were obtained by an Acoustic Doppler Current Profile (ADCP). Vertical and horizontal ship motion data were collected for twenty-five ships that made transits of the channel. The next step will be to further process and analyze the data.

### Entrance Channel Design Tool

The other paper on ship dynamics was presented by the Naval Surface Warfare Center, Carderock Division (NSWCCD) described collaborative work NSWCCD was undertaking with the U.S. Army Corps of Engineers to provide a channel

design tool based on underkeel clearance. NSWCCD has developed an operational entrance channel guidance system, the Environmental Monitoring and Operator Guidance System (EMOGS), that predicts the underkeel clearance of a deep draft ship in shallow entrance channels based on real-time environmental data of waves and water level. This system has been operating for 13 years at two locations. The purpose of this project is to convert EMOGS into a channel design tool based on underkeel clearance. Work is just beginning on this project. Once the channel design tool is completed, the U.S. Army Corps of Engineers will use field data collected with ships will be used to compare, calibrate the design tool and validate the assumptions associated with the tool.

#### Next Generation of Navigation Aids Research (NGEN NAV)

The Coast Guard Research and Development Center presented their ongoing research in the area of aids to navigation. The Coast Guard's interpretation of the next generation navigation systems were presented and compared to today's products. The main drivers for developing new products is cost savings, increased information for the maritime community, and increased safety. Many of the new aids to navigation will be taking advantage of augmented reality. This is the expanded knowledge of ones environment with useful layers of information. The plan is to develop a technology roadmap for next generation navigation aids, fill in the research and development gaps, and partner with industry and stakeholders to achieve this paradigm shift.

#### Integrated Marine Communications – A Tool to Improve Vessel Management

Next MariTEL and Harris Corporations presented their Integrated Marine Communications System. They described the conception, design, construction and implementation of the integrated voice, data and vessel tracking communications network. This network supports automatic voice and data calling from ship-to-shore, shore-to-ship, and ship-to-shore-to-ship. The network's security for this communication resides in a Network scrambling protocol that makes the conversations and data communications private. Department of Defense encryption can also be handled on the network. The current status is that real-time positioning information and ship-to-shore-to-ship calling is available in the Gulf of Mexico and up the Mississippi River to Memphis, Tennessee. Eventually, this system will be operational nationwide.

#### Automated Commercial Environment (ACE): Business and Technology Benefits

The U.S. Customs Service of the Department of Treasury described their modernization objectives to replace the Automated Commercial System with a new Automated Commercial Environment (ACE). The new program system will track imports and process them more efficiently by automating transactions, provide national views of importer activity for compliance purposes and increase flexibility. The new ACE will enhance national security by using relational databases to track cargo, ships, trucks, planes, and crews before port arrival. This will provide a national perspective for enforcement violations, and provide support for

sharing information among other government agencies nationwide. ACE will also be using the Internet, wireless communications and Artificial Intelligence to process information. The system is being developed in four stages and two release versions.